PB-239 658

LONG LAKE, CUMBERLAND COUNTY, MAINE

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
Maine National Guard
Maine Department of Environmental Protection

May 1974

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON

LONG LAKE
CUMBERLAND COUNTY
MAINE

EPA REGION I

WORKING PAPER No. 4

WITH THE COOPERATION OF THE

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

AND THE

MAINE NATIONAL GUARD

MAY, 1974

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FOREWORD

The National Eutrophication Survey was initiated in 1972 as a research project in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations and impact on selected fresh water lakes as a basis for formulating comprehensive and coordinated national, regional and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations and impacts can, in fact, be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

This report documents the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin. It is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/ standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Maine Department of Environmental Protection for professional involvement and to the Maine National Guard for conduct of the tributary sampling phase of the Survey.

William R. Adams, Commissioner of the Department of Environmental Protection, and William P. Hinckley and Matthew Scott of the Division of Lakes and Biological Studies, provided invaluable lake documentation and counsel during the course of the study.

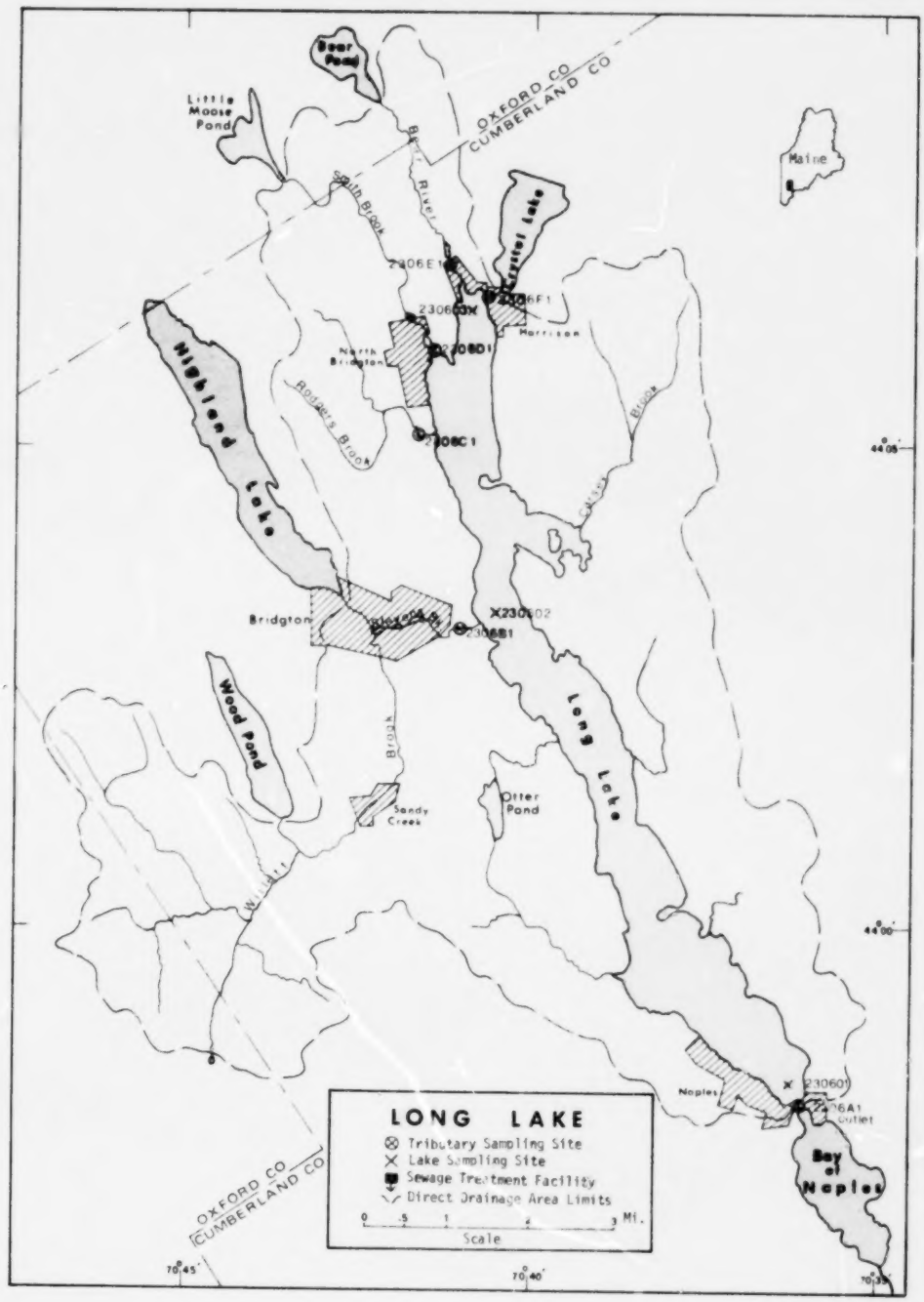
Major General Edwin W. Heywood (Retired), then the Adjutant General of Maine, and Project Officer Lieutenant Colonel Earl B. Adams who directed the volunteer efforts of the forty-one participating Maine National Guardsmen are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF MAINE

LAKE NAME	COUNTY
Moosehead Lake	Piscataquis, Somerset
Estes Lake	York
Long Lake	Cumberland
Bay of Naples & Sebago Lake	Cumberland
Rangeley Lake	Franklin
Long Lake	Aroostook
Mattawamkeag Lake	Aroostook
Sebasticook Lake	Penobscot


Bear Pond
Little Moose Pond
OXFORD CO
CUMBERLAND CO
Maine
South Brook
Crystal Lake
2306E1
2306F1
2306SX
Harrison
North Bridgton
2306B1
Highland Lake
Roberts Brook
2306C1
Bridgton
X230602
2306A1
Wood Pond
Sandy Creek
Otter Pond
Long Lake
Naples
230601
Bay of Naples
LONG LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Direct Drainage Area Limits
0 .5 1 2 3 Mi.
Scale
44°05'
44°00'
70°45'
70°40'

LONG LAKE, CUMBERLAND COUNTY

STORET NO. 2306

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Long Lake is mesotrophic, and agency personnel of the State of Maine confirm this conclusion.

B. Rate-Limiting Nutrient:

Algal assay results indicate that phosphorus was the limiting nutrient at the time the assay sample was collected.

C. Nutrient Sources; Controllability:

1. Point Sources - A regional waste collection and treatment system is planned to serve the communities of Bridgeton and Harrison and dwellings along the west side of the lake. When this facility becomes operational, it is estimated that the phosphorus loading from this source alone will exceed the existing phosphorus loading to Long Lake from all sources. It is concluded that phosphorus removal at the regional treatment facility will be required to protect Long Lake and other lakes in the Presumpscot River chain.

2. Non-Point Sources - Non-point source phosphorus loading entering the lake through tributaries or direct runoff presently amounts to 77.5% of the total (65.7% for N), however, these figures include substantial contributions from unsewered wastes by the west shore communities. Incorporation of these discharges into the proposed regional facility will reduce non-point impact.

II. INTRODUCTION

Long Lake, Cumberland County, is bounded by the townships of Bridgeton, Harrison, and Naples and is one of the three dominant water bodies on the upper Presumpscot River. The lake is used almost exclusively for recreational purposes and supports cold water species of fish.

Light industries are situated near the lake but reportedly have little effect on water quality. Also, a Bridgeton sewage treatment facility is planned that will serve some of the other communities.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry:

1. Surface area: 4,867 acres
2. Mean depth: 34 feet
3. Maximum depth: 59 feet
4. Volume: 165,478 acre/ft
5. Mean hydraulic retention time: 1.2 years

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area†	Mean flow†
Stevens Brook	41.6 mi^2	70.4 cfs
Rogers Brook	3.9 mi^2	8.0 cfs
Smith Brook	4.8 mi^2	8.4 cfs
Bear River	18.4 mi^2	30.5 cfs
Crystal Lake outlet	8.6 mi^2	14.8 cfs
Minor tributaries & immediate drainage -	29.1 mi^2	62.2 cfs
Totals	106.4 mi^2	194.3 cfs

2. Outlet -

Long Lake - Bay of Naples connection -	114.0 mi^2*	194.3 cfs

C. Precipitation**:

1. Year of sampling: 50.1 inches
2. Mean annual: 42.8 inches

*Includes area of lake
**See Working Paper No. 1, "Survey Methods."
†Drainage areas are accurate within ±1% and mean annual flows within ±5%.

IV. LAKE WATER QUALITY SUMMARY

Long Lake was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from a number of depths at each station (see map, page v). During each visit a single depth-integrated (15 ft. to surface) sample was composited from the three stations for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was composited for algal assays. Also, each time depth-integrated samples were collected at the stations for chlorophyll a analyses. Maximum depths sampled were 26 feet at station 1, 20 feet at station 2, and 22 feet at station 3.

It should be noted that the Survey Secchi disc values are consistently less than those observed by the Maine Department of Environmental Protection. Such variations could be attributed to fluctuations in cloud cover or sun angle (ambient light conditions), observer technique, water surface disturbance, or may, in fact, be the result of short-term water clarity differences.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake was essentially well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all samples.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

FALL VALUES

(10/02/72)

Parameter	Minimum	Mean	Median	Maximum
Temperature (Cent.)	16.4	16.9	16.9	17.2
Dissolved oxygen (mg/l)	7.7	8.2	8.2	8.5
Conductivity (μmhos)	50	50	50	50
pH (units)	6.5	6.6	6.6	6.8
Alkalinity (mg/l)	10	10	10	10
Total P (mg/l)	0.008	0.010	0.010	0.013
Dissolved P (mg/l)	0.006	0.007	0.007	0.011
NO_2 + NO_3 (mg/l)	0.030	0.032	0.030	0.040
Ammonia (mg/l)	0.040	0.047	0.045	0.060

ALL SAMPLES

Secchi disc (inches)	108	135	120	216

B. Biological characteristics:

1. Phytoplankton* -

Sampling Date	Dominant Genera	Number per ml
10/02/72	1. Flagellates	1,357
	2. Polycystis	879
	3. Chroococcus	704
	4. Dinobryon	352
	5. Synedra	352
	Other genera	1,607
	Total	5,251

* The other phytoplankton samples were lost in transit.

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent; personnel of the Maine Dept. of Environmental Protection believe these values are too low.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/03/72	01	3.3
	02	5.3
	03	1.3
08/07/72	01	2.8
	02	2.6
	03	4.9
10/02/72	01	3.9
	02	1.8
	03	2.8

C. Limitng Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.003	0.028	0.3
0.006 P	0.009	0.028	0.5
0.012 P	0.015	0.028	0.5
0.024 P	0.027	0.028	0.8
0.060 P	0.063	0.028	0.7
0.060 P + 10.0 N	0.063	10.028	38.4
10.0 N	0.003	10.028	0.3

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that potential productivity of Long Lake was relatively low at the time the sample was collected. Also, the increasing yields with the increasing increments of orthophosphorus (to about 0.015 mg/l) show that Long Lake was phosphorus limited. At ortho-P concentrations higher

than about 0.015 mg/l, however, yields do not increase until nitrogen is also added, which indicates the lake would probably become nitrogen limited if ortho-P concentrations were increased beyond 0.015 mg/l. Note that the addition of only nitrogen produced a yield not significantly different than the control yield.

D. Trophic Condition:

Based on the data collected during the Survey, Long Lake appears to be mesotrophic although Survey limnologists noted that the appearance of the lake was generally good during all sampling periods.

Nutrient levels in Long Lake were relatively low as was chlorophyll a. However, there was marked depression of dissolved oxygen below 15 feet at station 1 in August, and Ciullo (1971) also noted some dissolved oxygen depression in August of 1970.

Personnel of the Maine Department of Environmental Protection consider Long Lake to be mesotrophic; Ciullo (1972) is of the same opinion.

V. NUTRIENT LOADINGS*
(See Appendix B for data)

For the determination of nutrient loadings, from September, 1972, through August, 1973, the Maine National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of April and May when two samples were collected.

Through an interagency agreement, estimated flows for the year of sampling and a "normalized" or average year were provided by the Maine District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, tributary nutrient loads were calculated using mean concentrations and mean flows. Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were calculated using the mean concentrations in the Bear River at station E-1 and mean ZZ flows.

At present, there are no municipal waste treatment systems in the Long Lake drainage, although the Town of Bridgeton is partially sewered.

A. Waste Sources:

1. Municipal -

Name	Pop. Served	Treatment	Mean Flow (mgd)	Receiving Water
Bridgeton	600**	None	?	Stevens Brook
Harrison	None**	None	-	-

2. Industrial - Unknown

* Based on sampling frequency and variations in concentrations, single tributary loadings for gaged sites are believed to be within ±16% of the true value 67% of the time and within ±32% of the true value 95% of the time.

** Estimated sewered population.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Stevens Brook	2,080	34.2
Rogers Brook	300	4.9
Smith Brook	200	3.3
Bear River	600	9.9
Crystal Lake outlet	260	4.3
b. Minor tributaries & immediate drainage (non-point load)* -	1,220	20.0
c. Municipal STP's -		
None at present	-	-
d. Septic tanks** -	660	10.9
e. Industrial -		
Unknown	-	-
f. Direct Precipitation* -	760	12.5
Total	6,080	100.0

2. Outputs -

Long Lake - Bay of Naples Connection	3,060

3. Net annual P accumulation - 3,020

* Estimated; see Working Paper No. 1, "Survey Methods".
** Estimated 1,056 dwellings w/in 100 yards of lake, including camps.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load) -		
Stevens Brook	51,690	24.7
Rogers Brook	9,530	4.6
Smith Brook	8,580	4.1
Bear River	19,690	9.4
Crystal Lake outlet	7,750	3.7
b. Minor tributaries & immediate drainage (non-point load)* -	40,160	19.2
c. Municipal STP's -		
None at present	-	-
d. Septic tanks** -	24,820	11.9
e. Industrial -		
Unknown	-	-
f. Direct precipitation* -	46,890	22.4
Total	209,110	100.0

2. Outputs -

Long Lake - Bay of Naples Connection	173,660

3. Net annual N accumulation - 35,450 lbs.

* Estimated; see Working Paper No. 1, "Survey Methods".
** Estimated 1,056 dwellings w/in 100 yards of lake, including camps.

D. Mean Annual Non-point Nutrient Export by Sub-drainage Area:

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr
Stevens Brook	50	1,243
Rogers Brook	77	2,444
Smith Brook	42	1,788
Bear River	33	1,070
Crystal Lake outlet	30	901

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (1973). Essentially, his "dangerous" rate is the rate at which the receiving waters would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	1.2	0.6	43.0	7.3
grams/m^2/yr	0.14	0.07	4.8	0.8

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time for Long Lake:

"Dangerous" (eutrophic rate)	0.58
"Permissible" (oligotrophic rate)	0.29

F. Controllability of Nutrients:

1. Discussion -

At present, the phosphorus loading to Long Lake from all sources is only about half that proposed by Vollenweider (1973)

as permissible (i.e., an oligotrophic rate). However, when the regional waste treatment facility planned for Bridgeton, Harrison, and the west side of the lake becomes operational, point source contributions will increase markedly, and the total phosphorus loading at that time is likely to exceed the permissible level and result in degradation of the present mesotrophic condition of Long Lake.

The 1970 Census gives the population of Bridgeton as 2,970 persons and that of Harrison as 1,045 persons. Disregarding the number of sewer connections that may be made along the west side of Long Lake, if 65% of the combined population of the two communities becomes sewered and served by the treatment facility to be located at Bridgeton, the contributing population will be increased from the present estimated 600 persons to more than 2,600 persons. With only conventional treatment, at 2.5 lbs/P/capita/yr, the population served would result in a discharge of more than 6,500 lbs/P/yr to Long Lake, or more than is presently reaching the lake from all sources combined.

It is concluded that phosphorus removal at the regional waste treatment facility will be required to insure continuance of the present trophic state of Long Lake as well as the Bay of Naples downstream in the Presumpscot River chain.

VI. LITERATURE REVIEWED

Anonymous, 1953. Long Lake survey report. Dept. of Inland Fisheries & Game, Augusta.

Ciullo, Robert H., 1971 Final report on the water quality information and analysis program of Long Lake and its tributaries, Cumberland County, Maine. MS, Biology Dept., Nasson College, Springvale.

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Vollenweider, Richard A., 1973. Input-output models. MS, Canada Centre for Inland Lakes, Burlington, Ontario.

TRIBUTARY FLOW INFORMATION FOR MAINE 6/25/74

LAKE CODE 2306 LONG LAKE (CUMBERLAND CO.)

TOTAL DRAINAGE AREA OF LAKE 114.00

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
2306A1	114.00	190.00	150.00	401.00	436.00	21.00	32.00	48.00	32.00	89.00	206.00	400.00	335.00	194.88
2306B1	41.60	69.30	54.00	160.00	219.00	100.00	44.00	15.00	9.80	14.00	24.00	79.00	65.00	70.42
2306C1	3.91	5.50	4.00	10.00	28.00	13.00	4.70	2.20	1.70	2.40	4.50	11.00	8.50	7.97
2306D1	4.82	7.00	6.00	14.00	26.00	14.00	5.10	2.20	1.70	2.40	4.50	11.00	8.50	7.97
2306E1	18.40	25.00	22.00	56.00	98.00	48.00	20.00	7.90	5.40	7.20	12.00	34.00	31.00	30.51
2306F1	8.61	14.00	11.00	25.00	44.00	24.00	9.60	4.10	3.00	3.50	5.90	16.00	17.00	14.75
2306Z7	36.70	75.00	53.00	135.00	161.00	96.00	42.00	16.00	10.00	12.00	19.00	61.00	67.00	62.25

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 114.00
SUM OF SUB-DRAINAGE AREAS = 114.04
TOTAL FLOW IN = 2333.30
TOTAL FLOW OUT = 2340.00

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2306A1	9	72	66.00	16	52.00				
	10	72	250.00	14	257.00				
	11	72	588.00						
	12	72	424.00	2	564.00				
	1	73	312.00	7	116.00				
	2	73	328.00	3	1240.00				
	3	73	1010.00	3	96.00				
	4	73	301.00	8	329.00	21	213.00		
	5	73	584.00	6	356.00	20	572.00		
	6	73	336.00	2	343.00				
	7	73	324.00	14	201.00				
	8	73	315.00	12	245.00				
2306B1	9	72	22.00	16	17.00				
	10	72	74.00	14	26.00				
	11	72	149.00						
	12	72	118.00	2	164.00				
	1	73	123.00	7	59.00				
	2	73	165.30	3	493.00				
	3	73	450.00	3	86.00				
	4	73	186.00	8	195.00	21	153.00		
	5	73	198.00	6	121.00	20	194.00		
	6	73	117.00	2	119.00				
	7	73	103.00	14	64.00				
	8	73	85.00	12	64.00				

TRIBUTARY FLOW INFORMATION FOR MAINE 6/25/74

LAKE CODE 2306 LONG LAKE (CUMBERLAND CO.)

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2306C1	9	72	4.10	16	3.20				
	10	72	4.40	14	4.80				
	11	72	21.00						
	12	72	15.00	2	21.00				
	1	73	11.00	7	5.30				
	2	73	12.00	3	36.00				
	3	73	28.00	3	5.30				
	4	73	24.00	8	25.00	21	20.00		
	5	73	26.00	6	16.00	20	25.00		
	6	73	13.00	2	13.00				
	7	73	15.00	14	9.30				
	8	73	15.00	12	11.00				
2306D1	9	72	3.30	16	2.60				
	10	72	3.40	14	3.70				
	11	72	18.00						
	12	72	17.00	2	24.00				
	1	73	15.00	7	7.20				
	2	73	18.00	3	54.00				
	3	73	39.00	3	7.40				
	4	73	22.00	8	23.00	21	18.00		
	5	73	28.00	6	17.00	20	27.00		
	6	73	14.00	2	14.00				
	7	73	15.00	14	9.30				
	8	73	15.00	12	11.00				
2306E1	9	72	11.00	16	8.70				
	10	72	12.00	14	13.00				
	11	72	64.00						
	12	72	56.00	2	78.00				
	1	73	50.00	7	24.00				
	2	73	67.00	3	200.00				
	3	73	157.00	3	30.00				
	4	73	83.00	8	87.00	21	68.00		
	5	73	95.00	6	58.00	20	93.00		
	6	73	53.00	2	54.00				
	7	73	54.00	14	33.00				
	8	73	47.00	12	35.00				
2306F1	9	72	5.50	16	4.30				
	10	72	5.80	14	6.40				
	11	72	30.00						
	12	72	31.00	2	43.00				
	1	73	28.00	7	13.00				
	2	73	34.00	3	102.00				
	3	73	70.00	3	13.00				
	4	73	37.00	8	39.00	21	30.00		
	5	73	48.00	6	29.00	20	47.00		
	6	73	26.00	2	27.00				
	7	73	28.00	14	17.00				
	8	73	26.00	12	20.00				

TRIBUTARY FLOW INFORMATION FOR MAINE 6/25/74

LAKE CODE 2306 LONG LAKE (CUMBERLAND CO.)

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2306ZZ	9	72	19.00						
	10	72	19.00						
	11	72	115.00						
	12	72	122.00						
	1	73	148.00						
	2	73	162.00						
	3	73	379.00						
	4	73	137.00						
	5	73	190.00						
	6	73	112.00						
	7	73	110.00						
	8	73	87.00						

APPENDIX B

PHYSICAL AND CHEMICAL DATA

K - Value is less than indicated
J - Value known to be in error

STORET RETRIEVAL DATE 74/06/25

230601
43 58 18.0 070 36 06.0
LONG LAKE
23 MAINE

11EPALES
3

2111202
0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/03	19 05	0000	16.0	11.0	120	20	6.90	10K	0.050	0.010	0.006	0.002
	19 05	0020	14.9	9.2		20	6.80	10K	0.060	0.020	0.002	0.002K
72/08/07	14 15	0000			108	50K	6.60	10K	0.040	0.050	0.006	0.004
	14 15	0304	22.0	8.2		50K	6.60	10K	0.040	0.050	0.005	0.003
	14 15	0015	21.8	9.2		50K	6.30	10K	0.070	0.070	0.004	0.007
	14 15	0020	20.0	5.8		50K	6.40	10K	0.090	0.020	0.004	0.002
	14 15	0026	18.5	5.8		50K	6.20	10K	0.090	0.080	0.005	0.003
72/10/02	14 45	0000			120	50K	6.60	10K	0.030	0.050	0.008	0.008
	14 45	0004	17.1	8.2		50K	6.60	10K	0.030	0.040	0.013	0.007
	14 45	0015	16.9	8.2		50K	6.70	10K	0.040	0.050	0.012	0.007

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/03	19 05	0000	3.3J
72/08/07	14 15	0000	2.8J
72/10/02	14 45	0000	3.9J

STORET RETRIEVAL DATE 74/06/25

230602
44 03 24.0 070 40 48.0
LONG LAKE
23 MAINE

11EPALES
3

2111202
0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/03	19 30	0000	20.7	8.9	132	30	6.90	10K	0.050	0.020	0.007	0.006
	19 30	0020	19.1	8.7		30	6.80	10K	0.040	0.020	0.011	0.003
72/08/07	13 55	0000			132	50K	6.60	10K	0.040	0.060	0.008	0.006
	13 55	0004	23.0	7.8		50K	6.50	10K	0.040	0.050	0.008	0.006
	13 55	0015	21.6	10.8		50K	6.50	10K	0.050	0.050	0.009	0.004
72/10/02	14 20	0000			156	50K	6.60	10K	0.030	0.050	0.010	0.007
	14 20	0004	17.2	7.7		50K	6.60	10K	0.030	0.040	0.009	0.007
	14 20	0015	16.8	8.2		50K	6.60	10K	0.030	0.040	0.009	0.006
	14 20	0020	16.7	8.5		50K	6.85	10K	0.030	0.040	0.008	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/03	19 30	0000	5.3J
72/08/07	13 55	0000	2.6J
72/10/02	14 20	0000	1.8J

STORET RETRIEVAL DATE 74/06/25

230603
44 06 30.0 070 41 06.0
LONG LAKE
23 MAINE

11EPALES 2111202
3 0022 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/08	14 30	0000	19.7	9.1	120	20	7.00	10K	0.050	0.030	0.004	0.002
	14 30	0015	19.3	8.9		30	7.10	10K	0.050	0.030	0.006	0.003
	14 30	0022	19.0	8.8		25	6.80	10K	0.060	0.080	0.004	0.003
72/08/07	13 30	0000			108	50K	6.60	10K	0.030	0.050	0.010	0.007
	13 30	0004	23.1			50K	6.60	10K	0.030	0.050	0.008	0.006
	13 30	0015	23.1	8.6		50K	6.50	10K	0.030	0.040	0.010	0.006
	13 30	0020	23.0	11.8		120	7.00	10K	0.040	0.050	0.008	0.006
72/10/02	14 00	0000			216	50K	6.60	10K	0.040	0.060	0.012	0.008
	14 00	0004	17.0	8.2		50K	6.60	10K	0.030	0.040	0.011	0.007
	14 00	0015	16.4	8.2		50K	6.55	10K	0.030	0.060	0.011	0.011

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/08	14 30	0000	1.3J
72/08/07	13 30	0000	4.9J
72/10/02	14 00	0000	2.8J

APPENDIX C

TRIBUTARY and WASTEWATER

K - Value is less than indicated
J - Value known to be in error

STORET RETRIEVAL DATE 74/06/25

2306A1 LS2306A1
43 58 00.0 070 56 00.0
LONG LAKE OUTLET
23 15 SEBAGO LAKE
O/LONG LK-CUMBERLAND CO
US 302 BRDG IN NAPLES
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	12	15	0.063	0.250	0.082	0.005K	0.006
72/10/14	10	50	0.048	0.150	0.058	0.005K	0.005K
72/12/02	11	31	0.037	0.690	0.056	0.006	0.012
73/01/07	10	18	0.036	0.290	0.013	0.005K	0.005K
73/03/03	10	45	0.070	0.690	0.072	0.005K	0.010
73/04/08	13	15	0.096	0.100K	0.031	0.005K	0.005K
73/04/21	15	30	0.054	0.230	0.024	0.005K	0.005K
73/05/06	11	00	0.054	0.480	0.027	0.005K	0.010
73/05/20	16	30	0.072	0.240	0.013	0.005K	0.005K
73/06/02	10	20	0.065	0.320	0.012	0.005K	0.010
73/07/14	11	20	0.060	1.000	0.095	0.005K	0.020
73/08/12	13	15	0.012	0.540	0.056	0.006	0.010

STORET RETRIEVAL DATE 74/06/25

2306B1 LS2306B1
44 03 00.0 070 41 30.0
STEVENS BROOK
23 15 NORWAY
T/LONG LK-CUMBERLAND CO
XING NEAREST LK E OF BRIDETON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	11 30		0.056	0.400	0.067	0.009	0.019
72/10/14	10 10		0.063	0.350	0.088	0.006	0.021
72/12/02	10 47		0.054	0.310	0.058	0.007	0.017
73/01/07	09 35		0.066	0.290	0.029	0.005K	0.010
73/02/03	11 45		0.105	0.280	0.032	0.008	0.020
73/03/03	10 20		0.079	0.520	0.060	0.007	0.010
73/04/08	12 45		0.040	0.180	0.037	0.005K	0.010
73/04/21	12 15		0.038	0.270	0.022	0.005K	0.010
73/05/06	10 00		0.066	0.280	0.032	0.006	0.015
73/05/20	15 25		0.034	0.260	0.023	0.005K	0.015
73/06/02	09 40		0.039	0.320	0.022	0.005K	0.015
73/08/12	12 45		0.031	0.260	0.021	0.015	0.061

STORET RETRIEVAL DATE 74/06/25

2306C1 LS2306C1
44 05 00.0 070 42 00.0
RODGERS BROOK
23 15 NORWAY
T/LONG LK-CUMBERLAND CO
BRDG OF ST HWY 117 N OF BRIDGETON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	11	10	0.520	0.400	0.069	0.006	0.015
72/10/14	09	25	0.330	0.350	0.062	0.005K	0.012
72/12/02	10	31	0.210	1.100	0.084	0.037	0.060
73/01/07	09	20	0.330	0.320	0.013	0.005K	0.008
73/02/03	10	40	0.168	0.400	0.014	0.009	0.020
73/03/03	10	00	0.500	0.270	0.032	0.006	0.010
73/04/08	12	30	0.115	0.540	0.063	0.005K	0.010
73/04/21	14	15	0.176	0.260	0.050	0.005K	0.010
73/05/06	09	15	0.100	0.890	0.031	0.006	0.025
73/05/20	15	15	0.105	0.190	0.015	0.005K	0.015
73/06/02	09	15	0.138	0.340	0.050	0.005K	0.020
73/08/12	12	30	0.126	0.440	0.025	0.012	0.030

STORET RETRIEVAL DATE 74/06/25

2306D1 LS2306D1
44 06 00.0 070 41 30.0
SMITH BROOK
23 15 NORWAY
T/LONG LK-CUMBERLAND CO
ST HWY 117 BROG NE OF N BRIDGETON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	10	30	0.126	0.550	0.052	0.007	0.010
72/10/14	09	15	0.126	0.725	0.094	0.005K	0.010
72/12/02	10	20	0.051	0.460	0.022	0.005K	0.012
73/04/08	12	00	0.028	0.830	0.031	0.005K	0.005K
73/04/21	13	45	0.025	0.220	0.024	0.005K	0.010
73/05/06	08	45	0.042	0.290	0.036	0.005K	0.010
73/05/20	15	10	0.031	0.300	0.010	0.005K	0.010
73/06/02	09	00	0.036	0.420	0.031	0.005K	0.015
73/07/14	10	30	0.063	0.370	0.024	0.005K	0.030
73/08/12	12	20	0.034	0.240	0.010	0.013	0.015

STORET RETRIEVAL DATE 74/06/25

2306E1 LS2306E1
44 07 00.0 070 41 30.0
BEAR RIVER
23 15 NORWAY
T/LONG LK-CUMBERLAND CO
RD NW EDGE OF HARRISON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	10 10		0.039	0.275	0.050	0.005K	0.008
72/10/14	09 05		0.055	0.200	0.073	0.005K	0.008
72/12/02	10 05		0.064	0.440	0.019	0.005K	0.012
73/02/03	10 20		0.086	0.250	0.022	0.007	0.015
73/03/03	09 30		0.115	0.220	0.031	0.005K	0.015
73/04/08	11 45		0.092	0.100K	0.011	0.005K	0.005K
73/04/21	13 15		0.088	0.170	0.012	0.005K	0.005K
73/05/06	08 30		0.054	0.690	0.056	0.005K	
73/05/20	15 00		0.017	0.240	0.020	0.005K	0.010
73/06/02	08 50		0.034	0.470	0.029	0.005K	0.015
73/08/12	12 10		0.027	0.220	0.019	0.009	0.015

STORET RETRIEVAL DATE 74/06/25

2306F1 LS2306F1
44 06 30.0 070 41 00.0
CRYSTAL LAKE OUTLET
23 15 NORWAY
T/LONG LK-CUMBERLAND CO
ST HWY 35 BRDG IN HARRISON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	09 35		0.020	0.200	0.042	0.005K	0.009
72/10/14	09 00		0.028	0.200	0.052	0.005K	0.007
72/12/02	09 55		0.033	0.260	0.018	0.005K	0.015
73/01/07	08 40		0.052	0.220	0.019	0.005K	0.007
73/02/03	10 10		0.072	0.200	0.023	0.005K	0.010
73/03/03	09 15		0.071	0.190	0.022	0.015	0.020
73/04/08	11 30		0.056	0.160	0.019	0.005K	0.005K
73/04/21	12 45		0.054	0.270	0.020	0.005K	0.005K
73/05/06	08 15		0.054	0.220	0.024	0.005K	
73/05/20	14 55		0.034	0.220	0.011	0.005K	0.005K
73/06/02	08 40		0.033	0.220	0.016	0.005K	0.010
73/07/14	10 10		0.015	0.310	0.027	0.033	
73/08/12	12 00		0.010K	0.320	0.048	0.015	0.025